SECTION 15854 - CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes: Central-station air-handling units with coils for indoor installations.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 16 Section "Disconnect Switches and Circuit Breakers" for field-installed disconnect switches.
   2. Division 16 Section "Motor Controllers" for field-mounted alternating-current starters.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each central-station air-handling unit specified, including the following:
   1. Certified fan-performance curves with system operating conditions indicated.
   2. Certified fan-sound power ratings.
   3. Certified coil-performance ratings with system operating conditions indicated.
   4. Motor ratings and electrical characteristics plus motor and fan accessories.
   5. Material gages and finishes.

6. Filters with performance characteristics.
7. Dampers, including housings, linkages, and operators.

C. Shop Drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

D. Wiring diagrams detailing wiring for power and control systems and differentiating between manufacturer-installed and field-installed wiring.

E. Field test reports indicating and interpreting test results relative to compliance with specified requirements.

F. Maintenance data for central-station air-handling units to include in the operation and maintenance manual specified in Division 1 Sections.

1.4 QUALITY ASSURANCE

A. NFPA Compliance: Central-station air-handling units and components shall be designed, fabricated, and installed in compliance with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

B. UL Compliance: Electric coils, along with complete central-station air-handling unit, shall be listed and labeled by UL.

C. ARI Certification: Central-station air-handling units and their components shall be factory tested according to the applicable portions of ARI 430, "Central-Station Air-Handling Units," and shall be listed and bear the label of the Air-Conditioning and Refrigeration Institute (ARI).

D. UL and NEMA Compliance: Provide motors required as part of air-handling units that are listed and labeled by UL and comply with applicable NEMA standards.

E. Comply with NFPA 70 for components and installation.

F. Listing and Labeling: Provide electrically operated components specified in this Section that are listed and labeled.
   1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

G. Coordination: Coordinate layout and installation of central-station air-handling units with piping and ductwork and with other installations.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver air-handling unit as a factory-assembled module with protective crating and covering.

B. Lift and support units with manufacturer's designated lifting or supporting points.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate size and location of structural support members.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.

B. Filters: Furnish 1 set for each central-station air-handling unit.

C. Fan Belts: Furnish 1 set for each central-station air-handling unit fan. Extra belts same as those indicated on Air Handling Unit Schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. SnyderGeneral Corp.; McQuay Commercial Products Group.
2. The Trane Co.
3. Carrier Air Conditioning.

2.2 MANUFACTURED UNITS

A. General Description: Factory assembled, consisting of fans, motor and drive assembly, coils, damper, plenums, filters, drip pans, and mixing dampers.

2.3 CABINET

A. Materials: Formed and reinforced galvanized steel panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.

B. Insulation: Coated, glass-fiber insulation, complying with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," for insulation.
1. Thickness: 1-1/2 inches (40 mm).
2. Location and Application: Factory applied with adhesive and mechanical fasteners to the internal surface of section panels downstream from and including the cooling coil section.

C. Access Panels and Doors: Same materials and finishes as cabinet and complete with hinges, latches, handles, and gaskets.
1. Fan section shall have inspection and access panels and doors sized and located to allow periodic maintenance and inspections.

D. Drain Pans: Formed sections of galvanized steel sheet or PVC plastic. Fabricate pans in sizes and shapes to collect condensate from cooling coils (including coil piping connections and return bends) and humidifiers when units are operating at maximum catalogued face velocity across cooling coil.

2.4 FAN SECTION

A. Fan-Section Construction: Belt-driven centrifugal fans, consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure, equipped with formed-steel channel base for integral mounting of fan, motor, and casing panels. Mount fan scroll, wheel, shaft, bearings, and motor on structural-steel frame, with frame mounted on base with vibration isolation.

B. Housings: Fabricate from formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff, spun-metal inlet bell, and access doors or panels to allow entry to internal parts and components.

C. Fan Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and motor power. Fan wheel shall be double-width, double-inlet type with forward-curved blades or backward-curved airfoil blades as indicated.
   1. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
      a. Service Factor Based on Fan Motor: 1.2.
   2. Pulleys: Cast iron or steel with split, tapered bushing, dynamically balanced at factory.
   3. Motor Pulleys: Adjustable pitch, selected so pitch adjustment is at middle of adjustment range at fan design conditions.
   4. Belts: Oil resistant, nonsparking, and nonstatic; matched for multiple belt drives.
   5. Belt Guards: Fabricate to OSHA/SMACNA requirements, 0.1046 inch (2.7 mm) thick, 3/4-inch (20-mm) diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated.
   6. Motor Mount: Adjustable for belt tensioning.
   7. Vibration Control: Install fans on open-spring vibration isolators, minimum 1-inch (25-mm) static deflection, with side snubbers.

D. Fan-Section Source Quality Control: The following factory tests are required.

1. Sound Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Fans shall bear AMCA-certified sound ratings seal.
2. Factory test fan performance for flow rate, pressure, power, air density, rotation speed, and efficiency. Establish ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

2.4 MOTORS

A. Torque Characteristics: Sufficient to accelerate driven loads satisfactorily.

B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range.

C. Temperature Rating: 120 deg F (50 deg C) maximum temperature rise at 100 deg F (40 deg C) ambient for continuous duty at full load (Class A Insulation).

D. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors.

E. Motor Construction: NEMA MG-1, general purpose, continuous duty, Design B.
   1. Bases: Adjustable.

F. Bearings: The following features are required:
   1. Ball or roller bearings with inner and outer shaft seals.
   2. Permanently lubricated.
   3. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.

G. Enclosure Type: The following features are required:

1. Open dripproof motors where satisfactorily housed or remotely located during operation.
2. Guarded dripproof motors where exposed to contact by employees or building occupants.

H. Overload Protection: Built-in, automatic reset, thermal overload protection.

I. Noise Rating: Quiet.

J. Efficiency: Energy-efficient motors shall have a minimum efficiency as scheduled according to IEEE 112, Test Method B. If efficiency is not specified, motors shall have a higher efficiency than "average standard industry motors" according to IEEE 112, Test Method B.

K. Nameplate: Indicate full identification of manufacturer, ratings, characteristics, construction, and special features.

L. Starters, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 16 Sections.

2.5 COILS

A. Coil Sections: Common or individual, insulated, galvanized steel casings for heating and cooling coils. Design and construct to facilitate removal and replacement of coil for maintenance and to assure full airflow through coils.

B. Coil Construction: Rigidly supported across full face, pitched to allow drainage.
1. Fins: Aluminum, mechanically bonded to tubes.
2. Tubes: Seamless copper.
3. Coil Casing: Galvanized steel.

C. Water Coils: Drainable with threaded plugs, serpentine with return bends in smaller sizes and with return headers in larger sizes.

D. Coil-Performance Tests: Factory-test cooling and heating coils, except sprayed surface coils for rating according to ARI 410, "Forced-Circulation Air-Cooling and Air-Heating Coils."

2.6 FILTER SECTION

A. Filters: Comply with NFPA 90A.

B. Filter Section: Provide filter media holding frames arranged for flat or angular orientation, with access doors on one or both sides of unit.

C. Disposable Filters: 2-inch- (50-mm-) thick, viscous-coated fibers encased in fiberboard cell with perforated-metal media support, clean airflow resistance of 0.10 inch wg (25 Pa) at face velocity of 300 fpm (1.52 m/s) and ASHRAE 52.1 filter-arrestance efficiency of 70 to 82 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions to receive equipment, for compliance with installation tolerances and other conditions affecting performance of central-station air-handling units.

B. Examine roughing-in of hydronic piping, and electrical to verify actual locations of connections before installation.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install central-station air-handling units level and plumb, according to manufacturer's written instructions.
   1. Floor-Mounted Units: Support on concrete housekeeping bases using neoprene pads. Secure units to anchor bolts installed in concrete housekeeping base.

B. Arrange installation of units to provide access space around air-handling units for service and maintenance.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. The Drawings indicate the general arrangement of piping, fittings, and specialties. The following are specific connection requirements:
   1. Install piping adjacent to machine to allow service and maintenance.
   2. Connection piping to air-handling units with flexible connectors.
   3. Connect condensate drain pans using 1-1/4-inch NPS (DN32), Type M copper tubing. Extended to nearest floor drain.

B. Duct installation and connection requirements are specified in other Division 15 Sections. The Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connections.

C. Electrical: Conform to applicable requirements of Division 16 Sections.
   1. Connect fan motors to wiring systems and to ground. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
   2. Temperature control wiring and interlock wiring is specified in Division 15 Section "Control Systems Equipment."

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

3.5 CLEANING

A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.

B. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils entering air face.

3.6 COMMISSIONING

A. Manufacturer's Field Inspection: Engage a factory-authorized service representative to perform the following:
   1. Inspect field assembly of components and installation of central-station air-handling units including piping, ductwork, and electrical connections.
   2. Prepare a written report on findings and recommended corrective actions.

B. Final Checks before Startup: Perform the following before startup:
   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ductwork, and electrical are complete. Verify that proper thermal overload protection is installed in motors, starters, and disconnects.
   3. Perform cleaning and adjusting specified in this Section.
   4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
   5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
   6. Set zone dampers to fully open position for each zone.
   7. Set face-and-bypass dampers to full face flow.
   8. Set outside-air and return-air mixing dampers to minimum outside-air setting.
   9. Comb coil fins for parallel orientation.
   10. Install clean filters.

11. Verify that manual and automatic volume control, and fire and smoke dampers in connected ductwork systems are in fully open position.

C. Starting procedures for central-station air-handling units include the following:
   1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm.
      a. Replace fan and motor pulleys as required to achieve design conditions.
   2. Measure and record motor electrical values for voltage and amperage.
   3. Manually operate dampers from fully closed to fully open position and record fan performance.

D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for air-handling system testing, adjusting, and balancing.

3.7 DEMONSTRATION

A. Engage the services of a factory-authorized service representative to train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.

   1. Train Owner's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, and maintaining air handlining units. Provide minimum 6 hours operator training.
   2. Review data in the operation and maintenance manuals. Refer to Division 1.

3. Schedule training with Owner, through Architect, with at least 7 days' advance notice.

END OF SECTION 15854